

Remarks

The Applicants would like to thank Examiner Feggins for conducting the personal interview on February 24, 2004 for the above-identified application. During the interview, the differences between independent claims 24, 29 and 34 and newly applied reference, JP 08-336970, were discussed. The Examiner indicated that she understood the distinctions discussed by the Applicants' representative and that she would need to further consider JP 08-336970 in light of this discussion.

Claims 24, 25, 29, 30, 34 and 35 have been rejected under 35 U.S.C. §102(b) as being anticipated by JP 08-336970. Claims 26, 27, 31, 36, 40, 41 and 46 have been rejected under 35 U.S.C. §103(a) as being unpatentable over JP 08-336970 in view of Kobayashi (US 6,036,299). Claims 32, 37, 39, 42, 43 and 47-50 have been rejected under 35 U.S.C. §103(a) as being unpatentable over JP 08-336970 in view of Nakahara (US 6,042,218). Claims 44 and 45 have been rejected under 35 U.S.C. §103(a) as being unpatentable over JP 08-336970 in view of Kobayashi and further in view of Barrett (US 5,682,191). Claims 28, 33, 38 and 39 have been rejected under 35 U.S.C. §103(a) as being unpatentable over JP 08-336970 in view of Raman (US 4,730, 197).

These rejections are respectfully traversed and submitted to be inapplicable to the claims for the following reasons.

Claim 24 is patentable over JP 08-336970, since claim 24 recites an ink-jet recording apparatus having, in part, a flushing signal generating unit operable to generate a flushing signal that causes a recording head to jet only main ink particles through a nozzle so as to not form a mist. JP 08-336970 fails to disclose or suggest a flushing signal generating unit as recited in claim 24.

JP 08-336970 discloses an ink jet recording device having a piezoelectric oscillator 6, a pressure generating chamber 9, a common ink chamber 11, a condenser C, a discharge pulse generating circuit 22, a constant current circuit 23, and a time constant adjustment circuit 24. The common ink chamber 11 supplies ink to the pressure generating chamber 9. The discharge pulse generating circuit 22, the constant current circuit 23, and the time constant adjustment circuit 24 control the condenser C, which energizes the piezoelectric oscillator 6. Depending on a time constant set by the time constant adjustment circuit 24, a rate at which the piezoelectric oscillator 6 expands is varied and correspondingly, the rate at which the pressure generating chamber 9 contracts and the

speed at which the ink in the pressure generating chamber 9 is ejected vary. (See partial translation and Figures 1 and 2).

In jetting ink onto a recording medium, the ink jet recording device operates such that the time constant adjustment circuit 24 is initially set a first time constant $td1$ and the operation of the piezoelectric oscillator 6 is such that a first ink droplet is ejected from the pressure generating chamber 9 at a first speed $V1$. Then, the time constant adjustment circuit 24 sets a second time constant $td2$ which is smaller than the first time constant $td1$ and the operation of the piezoelectric oscillator 6 is such that a second ink droplet is ejected from the pressure generating chamber 9 at a second speed $V2$, which is higher than the first speed $V1$. Since the second ink droplet is moving at a higher speed, the second ink droplet catches up with the first ink droplet and the two droplets combine and move at a speed that is roughly the average of the first speed $V1$ and the second speed $V2$. Then, the time constant adjustment circuit 24 sets a third time constant $td3$ which is smaller than the second time constant $td2$ and the operation of the piezoelectric oscillator 6 is such that a third ink droplet is ejected from the pressure generating chamber 9 at a third speed $V3$, which is higher than the second speed $V2$. As a result, the third ink droplet catches up with the droplet formed by the first and second droplets and the first, second and third ink droplets combine to form a single droplet prior to reaching the recording medium. (See partial translation and Figure 5).

As discussed above, JP 08-336970 discloses an ink jet recording device that ejects a number of ink droplets at increasing speeds such that the ink droplets merge prior to reaching a recording medium (e.g., a piece of paper) during a recording (printing) operation, but fails to disclose or suggest a flushing operation for the pressure generating chamber 9. Further, JP 08-336970 fails to disclose a flushing signal generating unit operable to generate a flushing signal that causes a recording head to jet only main ink particles through a nozzle so as to not form a mist. As a result, JP 08-336970 fails to disclose or suggest the present invention as recited in claim 24.

Claim 29 is patentable over JP 08-336970, since claim 29 recites an ink-jet recording apparatus having, in part, a flushing signal generating unit operable to generate a flushing signal that causes a recording head to jet only ink particles with a momentum greater than a predetermined value through a nozzle so as to not form a mist. JP 08-336970 fails to disclose or suggest a flushing signal generating unit as recited in claim 29.

As discussed above with regard to claim 24, JP 08-336970 discloses an ink jet recording device that ejects a number of ink droplets at increasing speeds such that the ink droplets merge prior to reaching a recording medium (e.g., a piece of paper) during a recording (printing) operation. However, JP 08-336970 fails to disclose or suggest a flushing operation or a flushing signal generating unit. Therefore, JP 08-336970 necessarily fails to disclose or suggest a flushing signal generating unit operable to generate a flushing signal that causes a recording head to jet only ink particles with a momentum greater than a predetermined value through a nozzle so as to not form a mist. As a result, JP 08-336970 fails to disclose or suggest the invention as recited in claim 29.

Claim 34 is patentable over JP 08-336970, since claim 34 recites an ink-jet recording apparatus having, in part, a flushing signal generating unit operable to generate a flushing signal that causes a recording head to intermittently jet sets of ink particles comprising a main ink jet particle and minute ink jet particles after the main ink jet particle through a nozzle, wherein the minute ink jet particles of a previous set combine with the main ink jet particle of a following set in a range of a predetermined distance from the nozzle so that an amount of the minute ink jet particles scattered in mist can be reduced. JP 08-336970 fails to disclose or suggest a flushing signal generating unit as recited in claim 34.

As discussed above with regard to claim 24, JP 08-336970 discloses an ink jet recording device that ejects a number of ink droplets at increasing speeds such that the ink droplets merge prior to reaching a recording medium (e.g., a piece of paper) during a recording (printing) operation. However, JP 08-336970 fails to disclose or suggest a flushing operation or a flushing signal generating unit. Therefore, JP 08-336970 necessarily fails to disclose or suggest a flushing signal generating unit operable to generate a flushing signal that causes a recording head to intermittently jet sets of ink particles.

Further, JP 08-336970 fails to disclose or suggest that the sets of ink particles jetted as a result of a flushing signal comprise a main ink jet particle and minute ink jet particles after the main ink jet particle, wherein the minute ink jet particles of a previous set combine with the main ink jet particle of a following set in a range of a predetermined distance from the nozzle. Instead, JP 08-336970 only discloses ejecting ink droplets of equal size during a recording (printing) operation. As a result, JP 08-336970 fails to disclose or suggest the invention as recited in claim 34.

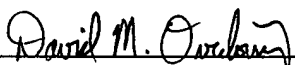
In other sections of the Office Action, Kobayashi, Nakahara, Barrett and Raman are relied upon as disclosing a number of features recited in the dependent claims. However, none of these references discloses or suggests the flushing signal generating units as recited in claims 24, 29 and 34.

Because of the above mentioned distinctions, it is believed clear that claims 24-50 are allowable over the references relied upon by the Examiner. Furthermore, it is submitted that the distinctions are such that a person having ordinary skill in the art at the time of invention would not have been motivated to make any combination of the references of record in such a manner as to result in, or otherwise render obvious, the present invention as recited in claims 24-50. Therefore, it is submitted that claims 24-50 are clearly allowable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. The Examiner is invited to contact the undersigned by telephone if it is felt that there are issues remaining which must be resolved before allowance of the application.

Respectfully submitted,

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